

BLC 2012 Plants 1 Group

Learning Objective: Long distance transport in plants and animals accomplishes the same goal but do it in different structural and physiological contexts.

Learning Outcome: Students should be able to compare and contrast the mechanisms that underlie transport in the xylem and phloem.

Summative Assessments:

Set 1.

Consider the diagram of a plant at left. In the daytime, identify which of these organs, in the context of sugar transport in the phloem, are metabolic sources and metabolic sinks.

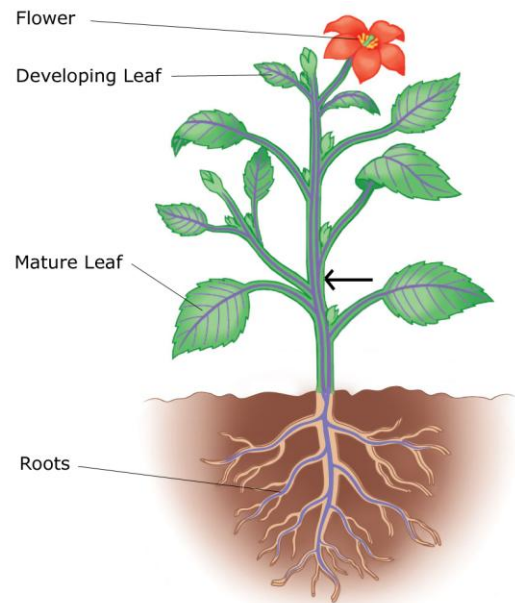
- | | | |
|----------------------|------------|----------|
| 1) Roots | a = source | b = sink |
| 2) Mature leaves | a = source | b = sink |
| 3) Developing leaves | a = source | b = sink |
| 4) Flowers/seeds | a = source | b = sink |

- 5) In the daytime, at the point indicated by the arrow, in which direction are sugars being transported in the phloem?

- a = toward the top of the stem
b = toward the base stem
c = both toward the top and bottom of the stem
d = there will be no transport of sugars in the stem in the daytime

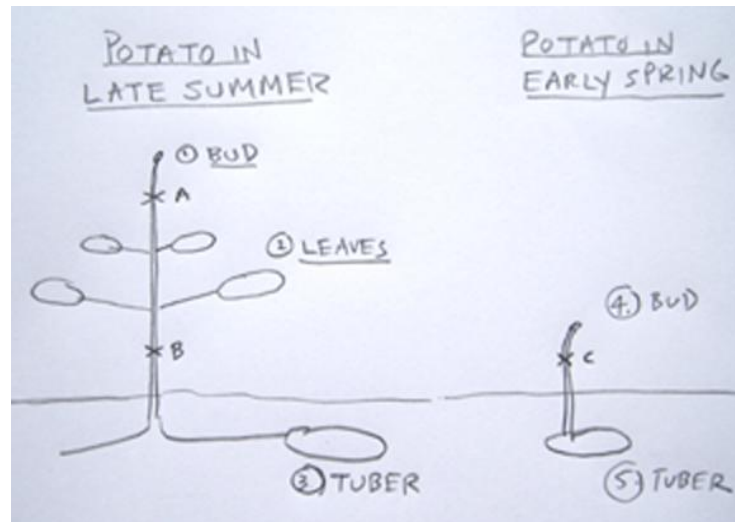
- 6) In the phloem of a source organ, the effect of an ATP synthesis inhibitor would be to

- a = increase the pressure in the source phloem
b = decrease the pressure in the source phloem
c = have no effect on the pressure in the source phloem



Set 2.

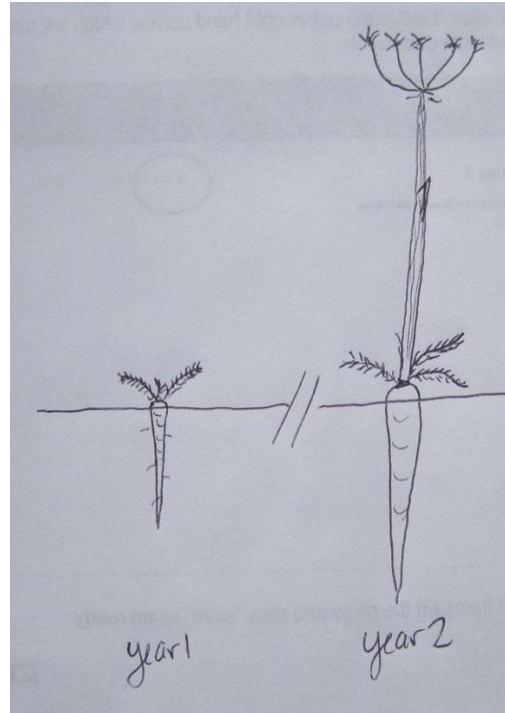
A potato is a plant organ that functions in the storage of carbohydrate. The potatoes develop over the course of the summer (left diagram). Over the winter, the above-ground portion of the potato plant dies back. In spring, new shoots develop from the potato (right diagram).



- 1) Which plant organs are sinks in the two diagrams?
 - a) 1, 2, and 3
 - b) 3 and 5
 - c) 1, 3, and 5
 - d) 1, 3, 4, and 5
 - e) 1, 3, and 4
- 2) Which plant organs are sources in the two diagrams?
 - a) 1, 2, and 4
 - b) 1, 2, 3, and 4
 - c) 2 and 5
 - d) 1, 3, and 4
 - e) 2
- 3) The direction of phloem transport would be
 - a) up at A, down at B and C
 - b) up at B down at A and C
 - c) up at C, down at A and B
 - d) up at A and C, down at B
 - e) up at A and C, down at C

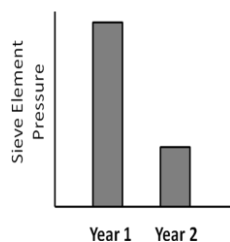
Formative Assessment:

Biennial plants like carrots grow leaves and a large storage organ (root) in their first year, then in the second year use the stored carbohydrates to build a large flowering stem.

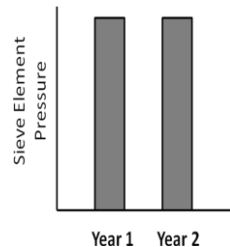


- 1) In year 1, what plant organ(s) is/are the carbohydrate source(s)?
 - a) Leaves
 - b) Root (carrot)
- 2) In year 1, what plant organ(s) is/are the carbohydrate sink(s)?
 - a) Leaves
 - b) Root(carrot)
 - c) Flowers
- 3) In year 1, sugars in the phloem move from
 - a) Leaves to roots
 - b) Root to leaves
 - c) Young leaves to old leaves
- 4) In year 2, sugars in the phloem move from
 - a) Leaves to roots
 - b) Root to leaves
 - c) Young leaves to older leaves
- 5) A student studying phloem transport inserts a pressure probe into the sieve elements of the phloem in the carrot root in year 1 and year 2.

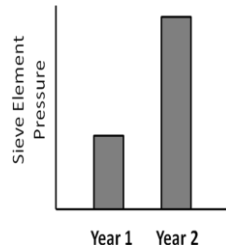
a.



b.



c.



d.

